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Term: L4 and network$

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DATE: Friday, July 23, 2004 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; PLUR=YES; OP=ADJ			
L6	L5 and encapsul$	0	L6
L5	L4 and network$	3	L5
L4	(6101550 or 6061723 or 6009473 or 5832224).pn.	4	L4
L3	L2	27	L3
L2	L1 and (polling with present$)	27	L2
L1	709/$.ccls.	15841	L1

END OF SEARCH HISTORY

h e b b g eee e f ff e ch

First Hit Fwd Refs

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L2: Entry 15 of 27 File: USPT May 9, 2000

DOCUMENT-IDENTIFIER: US 6061723 A
TITLE: Network management event correlation in environments containing inoperative network elements

Detailed Description Text (3):
Likewise, a computer implemented method of distinguishing between broken and inaccessible network elements, and for presenting this information to a network administrator in an easy to comprehend format, may comprise the steps of 1) discovering the topology of a plurality of network elements 124, 128-136, 2) periodically polling a plurality of network interfaces associated with the plurality of network elements 124, 128-136, 3) computing or validating a criticalRoute attribute for each of the plurality of network interfaces, and 4) analyzing the status of network interfaces identified by the criticalRoute attribute of an interface in question (IIQ) which is not responding to a poll.

Current US Original Classification (1):
709/224

Current US Cross Reference Classification (1):
709/225

Current US Cross Reference Classification (2):
709/229

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L2: Entry 19 of 27 File: USPT Nov 3, 1998

DOCUMENT-IDENTIFIER: US 5832224 A
** See image for Certificate of Correction **
TITLE: Entity management system

Detailed Description Text (58):
To elaborate on the above example, note that the presentation modules, during presentation of management information on a presentation device, use the service interface of the presentation device, because the presentation of information is the main service of the presentation device. However, an access module in the control arrangement may also manage the presentation device, for example by polling it to determine if it is turned on.

Detailed Description Text (156):
With reference to FIG. 7A, a request, which may be generated by a presentation module 10 in response to operations by an operator in connection with the contents of user interface information file 27, or which may be generated by information manager 15 during polling in connection with the various entities of the complex system being controlled, includes a plurality of parameters. All requests have the same structure, including an initial call identification, which is not shown, followed by parameters, which are depicted in FIG. 7A. As discussed above, the kernel 13, 14 has a single dispatcher 16, 21 having a presentation-functional aspect 16 and a functional-access aspect 21. Which of these aspects are respectively enabled by a request is determined by the initial call identifier. The initial call identifier may indicate a call to a functional module or an access module, and is respectively routed to the corresponding aspect of the dispatcher. A presentation or functional module may call a functional module, and a functional module or access module may call an access module, but a presentation module may only call an access module through a "control" functional module, as discussed above.

Current US Original Classification (1):
709/223

DOCUMENT-IDENTIFIER: US 5832224 A
** See image for Certificate of Correction **
TITLE: Entity management system

Brief Summary Text (3):
As digital data processing systems, or computers, have become smaller and less expensive, individual computers are being used by individuals and small groups. To enhance sharing of data, communications among users and economy in connection with resources which may be infrequently used by an individual, computers have been connected into networks which communicate by means of messages transmitted over communications links, which include, in addition to the computers used directly by the various users, servers which, for example, store large amounts of data which may be accessed, used and updated by a number of users in the system, thereby facilitating sharing of data. Servers may also control printers, telecommunications links, and so forth. In addition, servers may provide specialized computational services, such as database searching and sorting, and so forth. The various computers, which are termed clients, and servers are interconnected by a communications link to permit messages to be transferred among the various computers and servers comprising the distributed system.

Brief Summary Text (5):
The invention provides a new and improved control arrangement for controlling and monitoring a complex system, such as a distributed digital data processing system in which a plurality of computers communicate over, for example, a local area network.

Brief Summary Text (17):
A historical data recorder periodically accesses and stores new management information in the records in response to a predetermined schedule. The system is adapted to respond to a command specifying at least one desired time range, the time range possibly including past, present and future times, and the information manager includes means for satisfying the command by retrieving management information contained in the records, if possible, and otherwise accessing information relating to the specified time range from the entities. The information manager is configured to satisfy a command having a time range which includes all times prior to a specified time, by retrieving any record which is stored in the records during the time range, or otherwise accessing the information from the entities. The information manager is configured to satisfy a command by immediately accessing management information from the entities. Events occurring within the network are treated as a component of the state of the network and are stored in the records.

Detailed Description Text (2):
FIG. 1A depicts a functional block diagram of an arrangement constructed in accordance with the invention for controlling and monitoring the status and condition of a complex system. (The complex system itself is not shown.) Preliminarily, one example of a complex system controlled by the arrangement depicted in FIG. 1A includes a distributed digital data processing system, comprising a plurality of nodes, including individual computers, terminals, terminal servers and other components, which communicate by means of messages

transmitted over a network. One example of such a digital data processing system is described in U.S. patent application Ser. No. ****, filed ****. It will be appreciated, however, that the control arrangement depicted in FIG. 1A is not limited to the control of a distributed digital data processing system, but may be used to control a number of diverse types of complex systems.

Detailed Description Text (4):
For the purposes of this document, the components of the complex system will be called entities. Entities are discussed in terms of classes and instances. An entity class defines entities of a particular type, e.g. one class would include all local area network bridges from a given vendor. Each entity is a member of a class, and forms an instance of that class.

Detailed Description Text (14):
In one specific control arrangement for controlling a distributed digital data processing system, one functional module 11, for example, manages the topology of the network and shows the topology to an operator through a presentation module 10.

Detailed Description Text (15):
Another functional module 11 may comprise a configuration functional module that, for example, defines the configuration, that is, the various entity instances and their inter-relationships, of the distributed digital data processing system, permits an operator to control the configuration of the network, by enabling nodes and other entity instances to be added to or deleted from the network, changes access rights by the various users of the nodes, and also maintains a configuration (or instance) database by which the operator can determine the changes to the configuration of the network over time.

Detailed Description Text (24):
Access modules 12 for controlling and monitoring a distributed digital data processing system may control several different types of nodes or different levels in the message transfer protocols used by the nodes to generate and transfer messages. One access module 12 may, for example, control and monitor the status of various portions of a bridge that links two local-area networks together, permitting messages to be passed between nodes on the two local area networks. Such an access module 12 may, for example, initialize the bridge and enable it to start operating, disable the bridge, monitor its end-to-end operation, determine the number of message passing buffers it has and determine whether it has sufficient buffers to operate effectively in the system.

Detailed Description Text (25):
Another access module 12 may control and monitor the operation of the message generation and decoding portions of the various nodes of the distributed digital data processing system, the virtual circuits, sessions and other links established between nodes, various timers and counters indicating activity or inactivity thereover and so forth. Similarly, another access module 12 may control and monitor the operation of the nodes' network layer portions, which control the actual transmission and reception of messages over the network, including various message transmission and reception counters, transmission and reception timers, and so forth. Access modules 12 controlling both of these may also be used, in addition to monitoring the values of the various timers and counters, to establish limits on the number of concurrent virtual circuits and sessions that a node may maintain and establish other default and operational parameters.

Detailed Description Text (53):
Before proceeding further, it will be helpful to describe further the relationship between the control arrangement depicted in FIG. 1A, and the complex system being controlled. Specifically, referring to FIG. 2A, the control arrangement comprises a director 35, which includes all of the presentation modules 10, the functional

modules 11, and the access modules 12, along with the kernel 13, 14. The complex system includes one or more entities 36. Each entity 36 includes a service element 31, a management interface 30 and a service interface 33. The management interface controls and monitors the service element through an agent 34. The service element is the actual managed portion of the entity 36 and provides the entity's primary function or function. That is, the service element 31 performs the function of the entity required within the context of the distributed digital data processing system. If, for example, the entity performs communications over a network for a node, the service element 31 performs the communications.

Detailed Description Text (55):
The management of an entity is characterized by the directives it supports, and its attributes, which are, broadly, those parameters which relate to its functioning and control and are associated with directives. For example, if the entity is a router which communicates data packets through a distributed data processing network, the attributes of the router may include the number of packets transmitted, and the number of bytes transmitted. If the entity is a modem, the attributes may include the counters and status registers which relate to the modem operation. Examples of directives include SHOW, which will retrieve attribute values, and SET, which modifies attribute values.

Detailed Description Text (163):
Other qualifiers may be used as a distinct parameter of the request. For example, communications qualifiers include: a "TO <filename>" qualifier which sends the response of a request to a file named <filename>; a "FROM <filename>" qualifier which retrieves other request parameters from a file named <filename>; a "VIA PATH" qualifier which specifies a series of "hops" along a path, through a hierarchy of management modules (useful in specifying, e.g., the precise management module among several arrangements that will perform the operation); and a "VIA PORT" qualifier which specifies a particular network path a management module uses when performing the operation (useful, e.g., to specify that an access module will perform a diagnostic test using a specific EtherNet port.)

Detailed Description Text (262):
Providing an alarms functional module 11 permits an operator to establish alarm conditions on a dynamic or as-needed basis. Since the alarm conditions do not have to be pre-established in the control arrangement, the control arrangement can be used in controlling and monitoring a wide variety of diverse complex systems. For example, if the control arrangement is being used to control and monitor distributed digital data processing systems, which may have diverse configurations of nodes communicating over a network, the alarm conditions can be established by an operator based on the particular configuration. In addition, alarm conditions can be added by addition of rules to the alarm rule base 203, if a new alarm condition is discovered during operation of the complex system.

Other Reference Publication (2):
Brusil et al., "Toward a Unified Theory of Managing Large Networks" IEEE Spectrum, Apr. 1989, pp. 39-42.

Other Reference Publication (4):
LaPelle et al., "The Evolution of of Network Management Products" Digital Technical Journal, No. 3, Sep. 1986, pp. 117-128.

Other Reference Publication (6):
Sylor, "Managing Phase V DECnet Networks: The Entity Model" IEEE Network, Mar.3,1988, vol. 2, No. 2, pp. 30-36.

Other Reference Publication (10):
ANSI, X3T5.4, "Recommendation for User-Network Management and Maintenance Protocol General Aspects" Output Document X3T5.4/87-100, Draft, 1987.

Other Reference Publication (16):
IEEE Task Group, "Layer-Specific Systems Management Guidelines" 802.1 Network Management Task Group, Rev.A, Sep.2,1987, X3T5.4/87-193.

CLAIMS:

3. A system for controlling and carrying out management functions over members of a computer network, wherein said members interface within said network for control of primary information handling functions and said members further interface with said network to permit the carrying out of said management functions, said system comprising:

stored management modules adapted to carry out said management functions by independently interpreting and executing selected management-related commands and issuing other commands to other modules, each said command listing, in conformance with a common command syntax, the identity of the related network member and the operation to be performed, and

a kernel comprising a table of dispatch pointers for directing said commands to the respective modules in which they are to be interpreted and executed and wherein

said common command syntax provides fields for specifying subordinate network members, and operations.

5. A kernel-based computer or computer network management system, comprising

a kernel for receiving and forwarding commands related to computer or computer network management,

management agents interacting with said kernel to receive and deliver commands related to computer or computer network management,

said kernel establishing a common command language for said commands, each of said management agents interacting with said kernel in accordance with said common command language.

6. The kernel-based computer or computer network management system of claim 5, wherein said kernel forwards said commands to management agents associated with a command by reference to a computer or computer network device identified in said command.

7. The kernel-based computer or computer network management system of claim 5 wherein said agents are each associated with one or more specific computer or computer network devices, and said agents respond to specific commands for an associated computer or computer network device, the specific commands of one said agent being different than the specific commands for another said agent.

L2: Entry 16 of 27 File: USPT Dec 28, 1999

DOCUMENT-IDENTIFIER: US 6009473 A
TITLE: Using callbacks to effectively manage resources

Brief Summary Text (9):
The client polling approach presents a few disadvantages. One disadvantage is that adjustments to bandwidth allocations are triggered by the passage of time, rather than by the events that create the need to re-adjust the bandwidth allocation. As a consequence, clients often poll servers, incurring the overhead of transmitting a message, when no adjustment of the allocation of the bandwidth is needed. Furthermore, when the need to adjust the allocation of bandwidth to a non-real-time client arises, the allocation can not be adjusted until the non-real-time client polls the server.

Current US Original Classification (1):
709/233